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मानक

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IS 11277 (2004): Hydraulic fluid power - Gas-loaded accumulators with separator - Ranges of pressures and volumes and characteristic qualities [PGD 16: Fluid Power]



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“ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है”

Bhartrhari—Nitiśatakam

“Knowledge is such a treasure which cannot be stolen”

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भारतीय मानक

हाइड्रोलिक द्रव पावर — विलगक सहित गैस भरित संचायक —
दाब और आयतन की श्रेणियाँ तथा लाक्षणिक मात्राएँ
(पहला पुनरीक्षण)

Indian Standard

HYDRAULIC FLUID POWER — GAS-LOADED
ACCUMULATORS WITH SEPARATOR — RANGES OF
PRESSURES AND VOLUMES AND CHARACTERISTIC
QUANTITIES
(*First Revision*)

ICS 23.100.99

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NATIONAL FOREWORD

This Indian Standard (First Revision) which is identical with ISO 5596 : 1999 'Hydraulic fluid power — Gas-loaded accumulators with separator — Ranges of pressures and volumes and characteristic quantities' issued by the International Organization for Standardization (ISO) was adopted by the Bureau of Indian Standards on the recommendations of the Basic Fluid Power Sectional Committee and approval of the Medical Instruments, General and Production Engineering Division Council.

This Indian Standard was first published in 1985. Considerable assistance had been derived from ISO 2296-1982 'Hydraulic fluid power — Gas-loaded accumulators with separator — Range of pressures and volumes, characteristic quantities and identification' in the preparation of the standard. Consequent upon the revision of ISO 5596, the sectional committee dealing with the subject decided for the revision by adopting ISO 5596 : 1999 as Indian Standard.

The text of the ISO Standard has been approved as suitable for publication as an Indian Standard without deviations. Certain conventions are, however, not identical to those used in Indian Standards. Attention is particularly drawn to the following:

- a) Wherever the words 'International Standard' appear referring to this standard, they should be read as 'Indian Standard'.
- b) Comma (,) has been used as a decimal marker in the International Standard, while in Indian Standards, the current practice is to use a point (.) as the decimal marker.

CROSS REFERENCES

In the adopted standard reference appears to certain International Standards for which Indian Standards also exist. The corresponding Indian Standards which are to be substituted in their place are listed below along with their degree of equivalence for the editions indicated:

<i>International Standard</i>	<i>Corresponding Indian Standard</i>	<i>Degree of Equivalence</i>
ISO 3 : 1973 Preferred numbers — Series of preferred numbers	IS 1076 (Part 1) : 1985 Preferred numbers: Part 1 Series of preferred numbers (<i>second revision</i>)	Identical
ISO 5598 : 1985 Fluid power systems and components — Vocabulary	IS 10416 : 1992 Fluid power systems and components — Vocabulary (<i>first revision</i>)	do

Indian Standard

HYDRAULIC FLUID POWER — GAS-LOADED ACCUMULATORS WITH SEPARATOR — RANGES OF PRESSURES AND VOLUMES AND CHARACTERISTIC QUANTITIES

(First Revision)

1 Scope

This International Standard specifies the characteristic performance quantities required for defining, designing, and testing gas-loaded accumulators with separator, which are used in hydraulic fluid power systems.

It also defines ranges of pressures and volumes for these accumulators.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this International Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 3, *Preferred numbers — Series of preferred numbers*.

ISO 5598, *Fluid power systems and components — Vocabulary*.

3 Terms and definitions

For the purposes of this International Standard, the terms and definitions given in ISO 5598 and the following apply.

3.1

gas-loaded accumulator

accumulator with separation in which the liquid is pressurized using the compressibility of an inert gas (nitrogen, for example).

NOTE The separation is achieved by means of a bladder, diaphragm, piston, etc.

3.2

gas-loaded accumulator, transfer type

gas-loaded accumulator with a port for additional gas capacity from one or more gas bottle(s)

3.3

compatible fluid

fluid that has no significant effect on the nature or life of the parts of the accumulator, especially those made of elastomeric materials

4 Applications

4.1 Energy storage

The gas-loaded accumulator stores hydraulic fluid under pressure during a period of low energy demand from the circuit in which it is mounted. The stored hydraulic fluid is then returned to the circuit to supplement or replace the pump discharge temporarily or to ensure emergency operation.

4.2 Pulse or surge damping

The gas-loaded accumulator absorbs hydraulic fluid to reduce pressure peaks and returns hydraulic fluid to compensate for pressure drops. The accumulator thus reduces the amplitude of pressure oscillations in the circuit in which it is mounted.

4.3 Thermal compensation

The gas-loaded accumulator absorbs volume changes resulting from changes in the temperature of the hydraulic fluid contained in an isolated part of the circuit.

5 Characteristic quantities

The following quantities shall be used to define and design a gas-loaded accumulator.

5.1 Pressures

- p_0 = pre-charging pressure, i.e., the gas pressure in the accumulator when the hydraulic circuit is not under pressure (initial state) at a temperature of $20\text{ °C} \pm 5\text{ °C}$.
- p_1 = minimum working pressure of the hydraulic circuit.
- p_2 = maximum working pressure of the hydraulic circuit.
- p_3 = set pressure of the pressure relief valve for the accumulator, if one is fitted.
- p_4 = allowable pressure, i.e., the maximum permissible pressure for which the accumulator has been designed and/or qualified by test.
- p_5 or p_t = hydraulic test pressure; the ratio between p_5 and p_4 is defined by relevant national regulations or design codes.
- $\frac{p_2}{p_0}$ = allowable pressure ratio below which the accumulator type can be used.

Pressures shall be expressed in megapascals, with the equivalent value in bars in parentheses.

5.2 Volumes

- V = internal volume of the gas chamber.
- V_0 = gas volume at pressure p_0 .
- V_1, V_2 = volumes occupied by the gas contained in the accumulator and any additional gas bottles at pressures p_1 and p_2 , respectively (as defined in 5.1).
- V_S = swept volume of piston-type accumulator.
- ΔV = volume that can be stored or discharged between the two pressures p_1 and p_2 .

Volumes shall be expressed in litres.

5.3 Flow rates

- q_{in} = maximum volumetric flow rate into the accumulator.
 q_{out} = maximum volumetric flow rate out of the accumulator.

Flow rates shall be expressed in litres per minute.

5.4 Temperatures

- t_1 = minimum operating temperature of the hydraulic fluid or of the environment, whichever is lower.
 t_2 = maximum operating temperature of the hydraulic fluid or of the environment, whichever is higher.
 $t_{c,min}$ = minimum design temperature; $t_{c,min}$ shall be lower than or equal to t_1 .
 $t_{c,max}$ = maximum design temperature; $t_{c,max}$ shall be higher than or equal to t_2 .

Temperatures shall be expressed in degrees Celsius.

6 Ranges of pressures and volumes

6.1 Nominal pressure range, p_4

6,3 (63) – 10 (100) – 16 (160) – 20 (200) – 25 (250) – 31,5 (315) – 40 (400) – 50 (500) – 63 (630)

Pressures are expressed in megapascals, with the equivalent value in bars in parentheses.

For special applications that require lower or higher pressures, use pressures corresponding to the R 10 series of preferred numbers (see ISO 3).

6.2 Nominal volume range, V

0,25 – 0,4 – 0,5 – 0,63 – 1,0 – 1,6 – 2,5 – 4,0 – 6,3 – 10 – 16 – 20 – 25 – 32 – 40 – 50 – 63 – 100 – 160 – 200

Volumes are expressed in litres.

For special applications that require smaller or larger volumes, use volumes corresponding to the R 10 series of preferred numbers (see ISO 3).

7 Identification statement (reference to this International Standard)

Use the following statement in test reports, catalogues, and sales literature when electing to comply with this International Standard:

“Ranges of pressures and volumes, and characteristic quantities for gas-loaded accumulators with separator selected in accordance with ISO 5596:1999, *Hydraulic fluid power — Gas-loaded accumulators with separator — Ranges of pressures and volumes and characteristic quantities.*”

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Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the latest issue of 'BIS Catalogue' and 'Standards : Monthly Additions'.

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Amendments Issued Since Publication

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